



UNITED STATES PATENT AND TRADEMARK OFFICE

cel

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/786,187	02/25/2004	Ping-Hsu Chen	67,200-1070	3693

7590 05/04/2005

TUNG & ASSOCIATES
Suite 120
838 W. Long Lake Road
Bloomfield Hills, MI 48302

EXAMINER

NOVACEK, CHRISTY L

ART UNIT PAPER NUMBER

2822

DATE MAILED: 05/04/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/786,187

Applicant(s)

CHEN ET AL

Examiner

Christy L. Novacek

Art Unit

2822

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 25 February 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 25 February 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

This office action is in response to the communication filed February 25, 2004.

Specification

The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required: Claims 3, 6, 8, 11 and 14 recite the claim limitation of the focused ion beam having a current density of “about 200-800 pA”. However, the specification states that the current density is “400-800 pA” (pg. 17, ln. 17-18; pg. 20 ln. 4-5). The specification does not provide support for the current density to be less than 400 pA.

Claim Objections

Claims 1 and 9 are objected to because of the following informalities: In line 2 of claim 1 and line 2 of claim 9, the word “layer” should be inserted after “opaque”. Appropriate correction is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 9 and 16 are rejected under 35 U.S.C. 102(b) as being anticipated by Livengood et al. (US 5,952,247).

Regarding claim 1, Livengood discloses providing a focused ion beam (FIB) and exposing alignment marks (35) by impinging the FIB against an opaque layer (40) to obliterate the opaque layer overlaying the alignment marks (Fig. 3d-3h; col. 5, ln. 62 – col. 11, ln. 20).

Regarding claim 9, Livengood discloses providing a focused ion beam (FIB) and cutting an exposure opening in an opaque layer to expose alignment marks by impinging the FIB against the opaque layer (Fig. 3d-3h; col. 5, ln. 62 – col. 11, ln. 20).

Regarding claim 16, Livengood discloses exposing alignment marks on a substrate having a transparent dielectric layer (47) overlying the alignment marks and an opaque layer overlying the dielectric layer, providing a focused ion beam and cutting an exposure opening in the opaque layer to the dielectric layer to visually expose the alignment marks by impinging the focused ion beam against the opaque layer (Fig. 3d-3h; col. 5, ln. 62 – col. 11, ln. 20).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 2, 5, 10, 13, 17 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Livengood et al. (US 5,952,247) in view of Mizumura et al. (US 5,825,035).

Regarding claims 2, 5, 10, 13, 17 and 19, Livengood discloses using a focused ion beam to etch the opaque silicon substrate, but does not disclose the type of ions used in the FIB etch. Mizumura discloses that a FIB system using argon (a noble gas) ions can successfully be used to

Art Unit: 2822

process a silicon substrate without contamination (col. 4, ln. 22-28; col. 27, ln. 41 – col. 28, ln. 36). At the time of the invention, it would have been obvious to one of ordinary skill in the art to use an FIB system with an argon ion source to etch the silicon substrate of Livengood because Livengood does not disclose using any particular ion source and Mizumura teaches that an ion source of argon can successfully process a silicon substrate without contamination.

Claims 3, 11 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Livengood et al. (US 5,952,247) in view of Lee et al. (US 6,251,782).

Regarding claims 3, 11 and 18, Livengood discloses using a focused ion beam to etch the opaque silicon substrate but does not disclose the current density of the FIB etch. Lee discloses that a FIB system having a current density of 672 pA can successfully etch silicon (col. 6, ln. 19-33). At the time of the invention, it would have been obvious to one of ordinary skill in the art to FIB etch the silicon of Livengood using a current density of 672 pA because Livengood does not disclose using any particular current density and Lee teaches that a current density of 672 pA can successfully etch silicon.

Claims 4, 7, 8, 12 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Livengood et al. (US 5,952,247) in view of Lee et al. (US 6,251,782) as applied to claim 3 and 11 above, and further in view of Mizumura et al. (US 5,825,035).

Regarding claims 4, 7, 8, 12 and 15, Livengood discloses using a focused ion beam to etch the opaque silicon substrate, but does not disclose the type of ions used in the FIB etch. Mizumura discloses that a FIB system using argon (a noble gas) ions can successfully be used to process a silicon substrate without contamination (col. 4, ln. 22-28; col. 27, ln. 41 – col. 28, ln.

Art Unit: 2822

36). At the time of the invention, it would have been obvious to one of ordinary skill in the art to use an FIB system with an argon ion source to etch the silicon substrate of Livengood because Livengood does not disclose using any particular ion source and Mizumura teaches that an ion source of argon can successfully process a silicon substrate without contamination.

Claims 6, 14 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Livengood et al. (US 5,952,247) in view of Mizumura et al. (US 5,825,035) as applied to claims 2, 13 and 19 above, and further in view of Lee et al. (US 6,251,782).

Regarding claims 6, 14 and 20, Livengood discloses using a focused ion beam to etch the opaque silicon substrate but does not disclose the current density of the FIB etch. Lee discloses that a FIB system having a current density of 672 pA can successfully etch silicon (col. 6, ln. 19-33). At the time of the invention, it would have been obvious to one of ordinary skill in the art to FIB etch the silicon of Livengood using a current density of 672 pA because Livengood does not disclose using any particular current density and Lee teaches that a current density of 672 pA can successfully etch silicon.

Conclusion


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christy L. Novacek whose telephone number is (571) 272-1839. The examiner can normally be reached on Monday-Thursday and alternate Fridays 7:30 - 5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian can be reached on (571) 272-1852. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Art Unit: 2822

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

CLN
May 2, 2005



AMIR ZAREABIAN
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800